

Characteristics of the section *Monninopsis* nearest *P. scoparioides* Chod., but the resemblance to this species is not close. — STEPHEN F. AUSTIN STATE COLLEGE, NACOGDOCHES, TEXAS.

THE AQUATIC FORM OF *ALISMA SUBCORDATUM* Raf.

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Alisma subcordatum is a common species of marsh or aquatic herb of temperate North America and usually grows emersed with ovate or elliptical aerial leaves. In the fall of 1958 a botany class at the University of New Hampshire collected a specimen growing in 1½ feet of water which had narrow-lanceolate floating leaves. Subsequently other plants with floating leaves were collected in the vicinity of Durham, N. H. While a deep water form of the European *Alisma plantago-aquatica* is recognized (Arber 1920, 1925), apparently most authors do not recognize a similar form in the American species. Muenscher (1944), Fassett (1957), Fernald (1950) and Hendricks (1957) do not mention a deep water form, but Pierce (*In Gleason 1952*, vol. 1, p. 88) states that plants growing in relatively deep water or where the water level varies have longer, laxer, ovate-lanceolate to linear leaves.

The following experiments were conducted in the greenhouse to test the response of plants to varying depths of water. Seeds were stratified at 5° C. for 60 days according to the recommendations of Crocker and Barton (1952), and were then germinated in sand under water. On April 1 the seedlings were transplanted to muck soil in battery jars, about 20 seedlings per jar. The water levels were adjusted to 2 cm (10 jars), 12 cm (4 jars) and 25 cm (2 jars). Nothing more was done to the plants except to maintain the water level. By early July, four to six plants in each jar with 2 or 12 cm of water had produced aerial leaves and inflorescences. In addition, the plants grown in 12 cm of water produced floating leaves. Plants grown in 25 cm of water, however, produced only floating leaves.

During the course of development from seedling to flowering stage, *Alisma subcordatum* produces three types of leaves. Seedlings possess a cluster of several gramineous, primary leaves, 3-5 cm in length which are usually submerged. As the plants mature they next produce petioled, narrow-lanceolate, juvenile leaves. If emersed, the later juvenile leaves develop into ovate, aerial leaves, but if submerged, the later juvenile leaves retain their narrow form, the petioles elongate, and the blades float on the surface of the water.

The next phase of the experiment was designed to test the effect of a raised water level on the development of plants which previously had been grown in shallow water. Four of the ten jars which had been maintained at the 2 cm level were used. The water level was raised to 25 cm in two of these. Inflorescences were removed from the plants in one of these jars and also from the plants in one of the jars with 2 cm of water. The status of each jar was then as follows:

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| No. 1 | 25 cm water; inflorescences not removed |
| No. 2 | 25 cm water; inflorescences removed |
| No. 3 | 2 cm water; inflorescences not removed |
| No. 4 | 2 cm water; inflorescences removed |

A month later the plants in jars 1 and 2 had produced only floating leaves. Those in jar 2 also produced reduced inflorescences. The plants in jars 3 and 4 produced new aerial leaves and new inflorescences.

The plants which had been grown continuously in 12 cm of water produced aerial leaves, floating leaves and flowers throughout the summer. Plants growing in 25 cm of water from the beginning produced only floating leaves during the entire period of observation.

Similar observations on the growth of *Alisma plantago-aquatica* have been made by Arber (loc. cit.). This species also commonly occurs in shallow water and produces aerial leaves. The aerial leaves are preceded by submerged, "band-shaped", primary leaves and usually by "swimming leaves" as well. In moderately deep water, only submerged and "swimming leaves" are produced. These "swimming leaves"

appear to be equivalent to the juvenile or floating leaves observed in the present study.

The plants used in this experiment were the smaller-flowered, more southern species *Alisma subcordatum*. Although not recognized very widely by botanists, the aquatic form of this species probably occurs rather commonly. This experiment has shown that plants of *Alisma* have the ability to produce floating leaves if submersed at any time during their period of development.

Specimens cited: in 1 to 1½ feet of water, old reservoir, Durham, Strafford County, N. H. R. W. Rhoades and A. R. Hodgdon. 16 Oct. 1958 (NH); in 2 feet of water, Hepler's Pond, Madbury, Strafford County, N. H. R. W. Rhoades. 1 Nov. 1959 (N.H.).

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LITERATURE CITED

- ARBER, A. 1920. Water plants. Cambridge, England.
 ——— 1925. Monocotyledons. University Press, Cambridge.
 CROCKER, W. and L. V. BARTON. 1952. Physiology of seeds. Chronica Botanica Co. Waltham, Mass.
 FASSETT, N. C. 1957. A manual of aquatic plants (Revision appendix by E. C. Ogden). University of Wisconsin Press. Madison.
 FERNALD, M. L. 1950. Gray's Manual of Botany, 8th ed. American Book Co. New York.
 HENDRICKS, A. J. 1957. A revision of the genus *Alisma* (Dill.) L. Amer. Midl. Nat. 58: 470-493.
 MUENSCHER, W. C. 1944. Aquatic plants of the United States. Ithaca, New York.
 PIERCE, J. H. 1952. Alismaceae. In Illustrated flora of the northern United States and adjacent Canada by H. A. Gleason. New York Botanical Garden.

MAZUS REPTANS (SCROPHULARIACEAE) IN MARYLAND. — *Mazus reptans* N. E. Brown, Bot. Mag. t. 8554, 1914, is a freely stoloniferous, mat-forming perennial with flowers half again as large as those of the non-stoloniferous, annual *M. japonicus* (Thunb.) Kuntze. The latter species is the only one hitherto reported as wild in the